

About AIRNow

Prepared by:

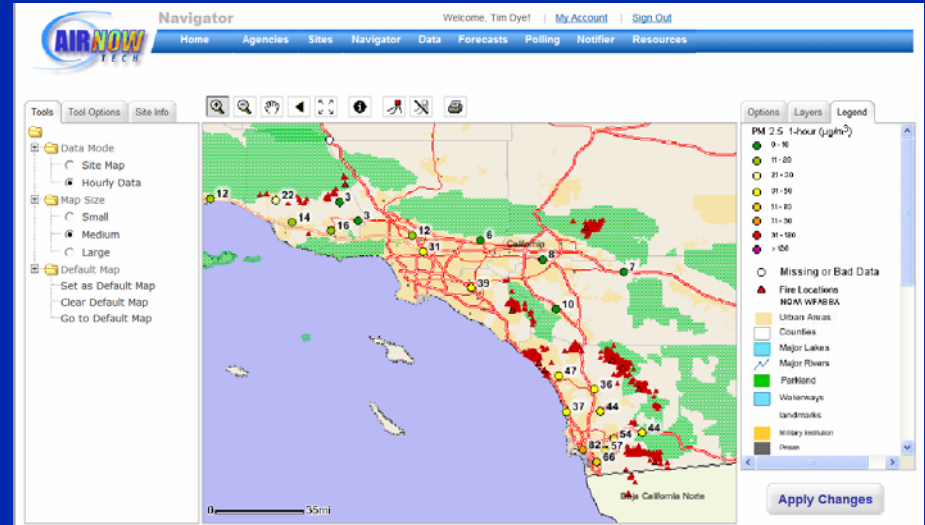
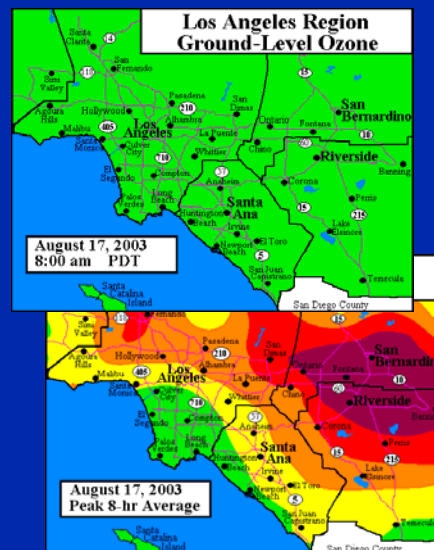
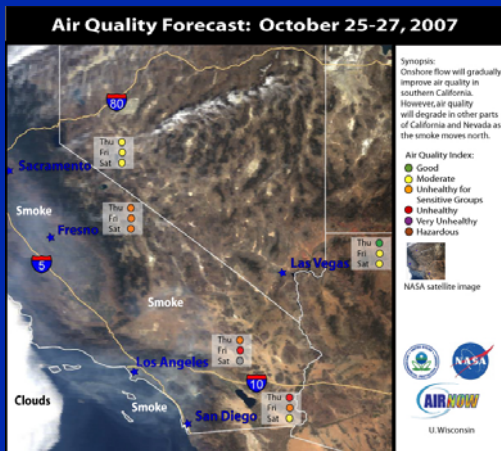
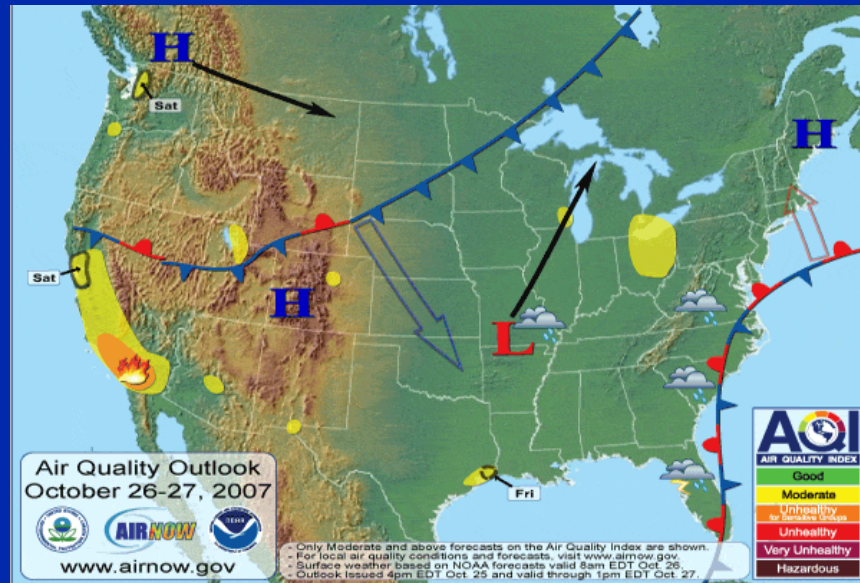
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October 29, 2007

Outline

About AIRNow

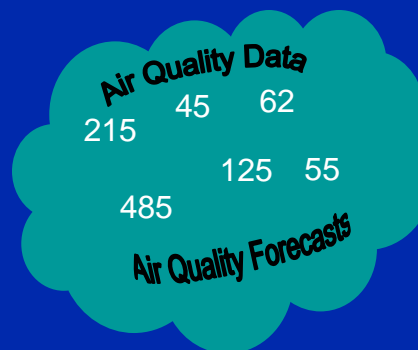
- Purpose
- Functions
- Data
- Components



AIRNow's Purpose

Data → → → Decision

- Inform the public and media
- Inform decision makers
- Provide data to other systems



AIRNow's Functions

Program

- Coordination: with 800+ stakeholders, 120 agencies
- Monitoring: 2,000 sites, 300 forecasts
- Assistance: 120 agencies, 30+ media users, 20+ data users
- Education: to stakeholders
- Media outreach: inform print, TV, web outlets

Systems

- Centralization: 1-stop data source for real-time/forecast data
- Quality control : automated and manual quality checks
- AQI conversion: consistency across the nation
- Mapping: quick mapping methods
- Distribution: data for public, media, researchers, systems

AIRNow Data

Air Quality Data

- Hourly concentrations
- Ozone, PM_{2.5}, PM₁₀, SO₂, NO₂, etc.

Meteorological Data

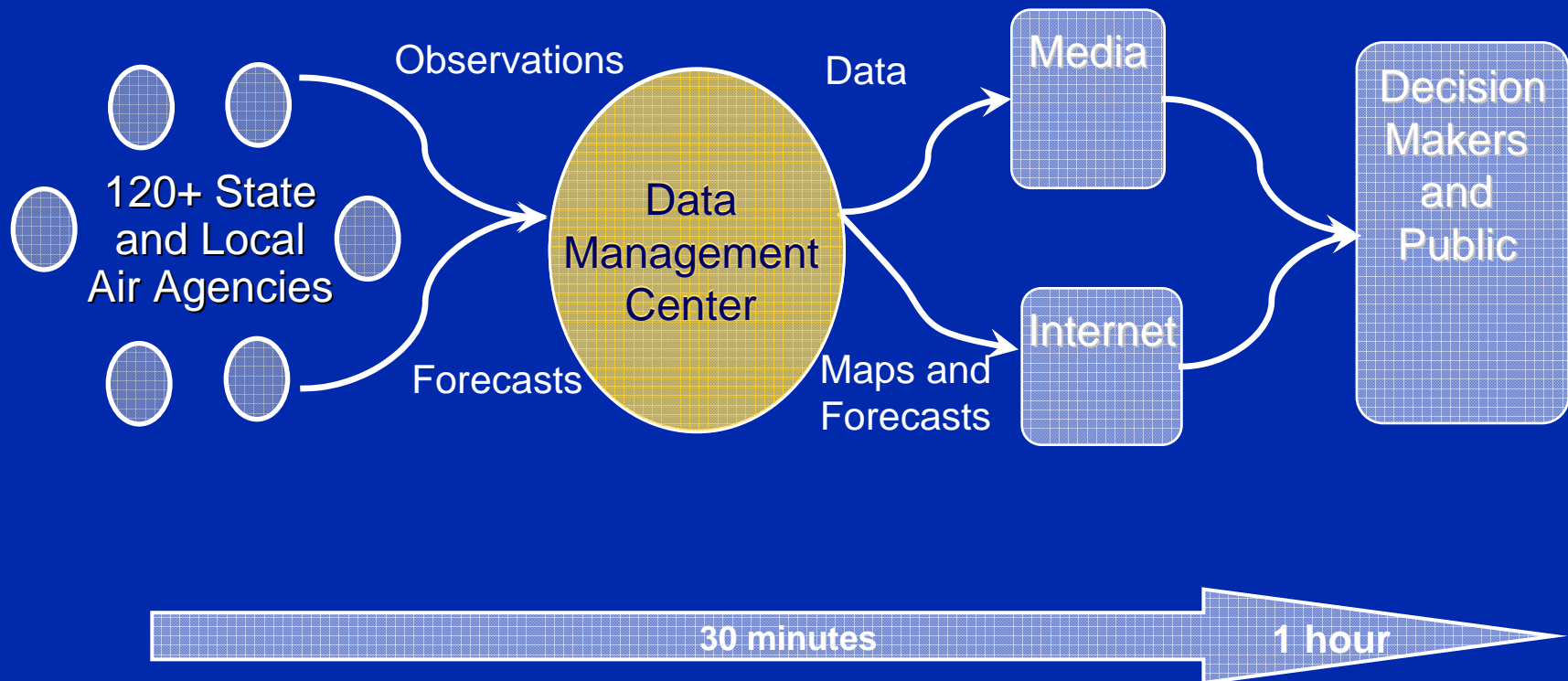
- Hourly values
- WS, WD, T, RH, Press, etc.

Forecasts

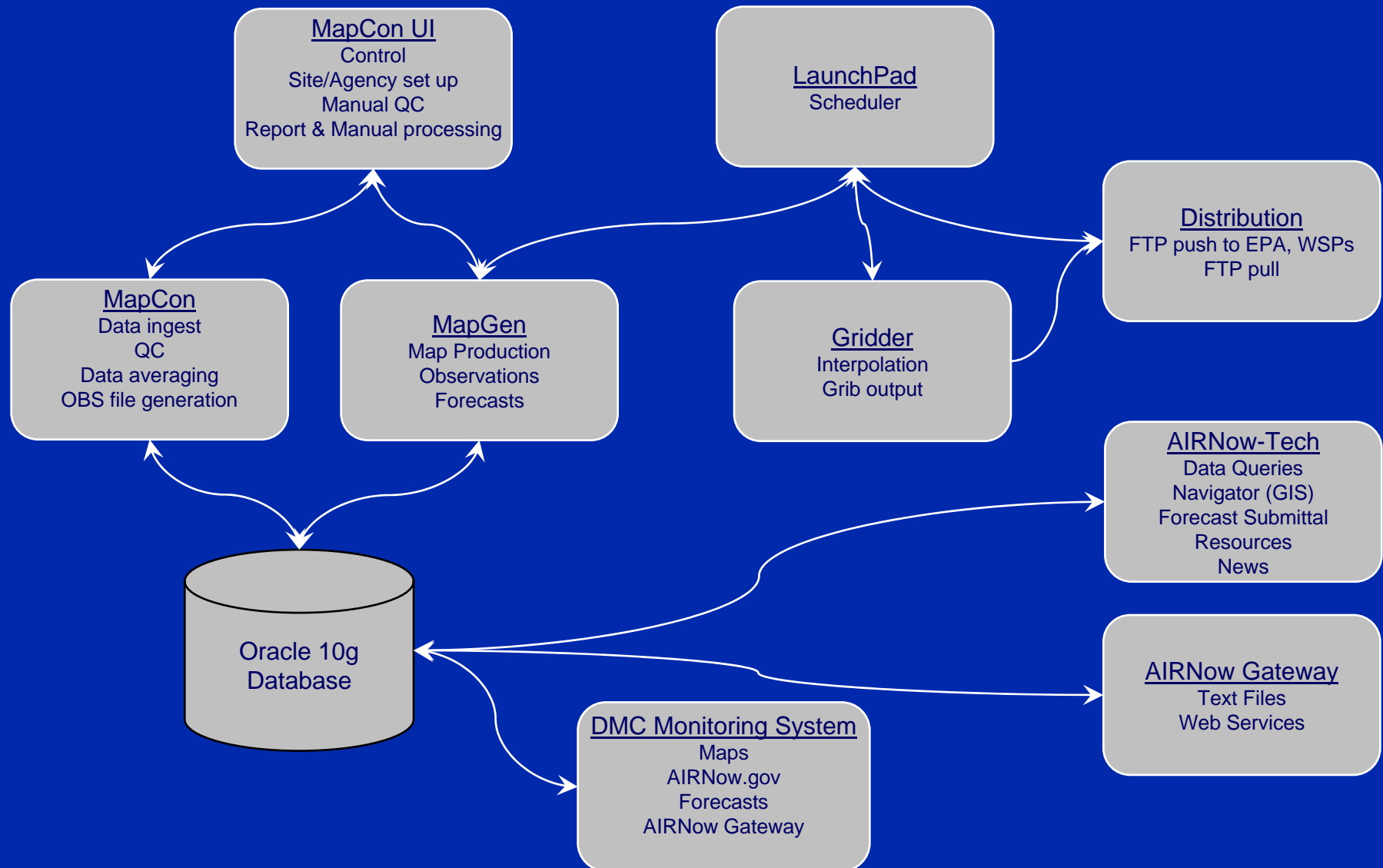
- City maximum values (AQI)

AIRNow Components

Hourly AIRNow Data Flow



AIRNow Components

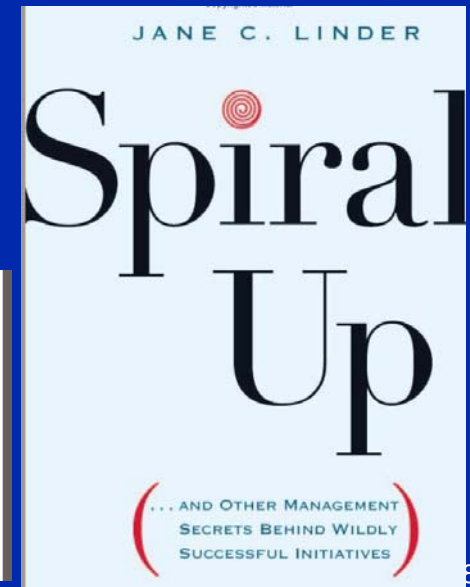


AIRNow's "Human Side"

- Not just a system!
- Community
 - Annual conference
 - Daily interaction with stakeholders
 - Support during events
 - Tool development to save effort



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About AIRNow-International Technical Details

Outline

- Functions and Features
- Components
- Software
- Collaborations
- Issues
- Plans

Functions and Features (1 of 2)

Data Processing and Monitoring

1. Ingests air quality and meteorological data (real-time and historical)
2. Ingests data from other systems
3. Quality controls data (real-time and historical)
4. Creates averages and aggregates of the data
5. Automatically processes data, allows for manual processing
6. Flexibility to compute different Air Quality Indices (API, PSI, AQI, etc.)
7. Ability to add, delete, modify data, parameters, sites, agencies, and users
8. Monitoring system performance and outputs
9. Creates data report generator

Data Mapping

1. Provides visually appealing maps and graphics
2. Uses GIS-based mapping system
3. Options for blending and creating maps

Functions and Features (2 of 2)

Information Distribution

1. Creates mechanism to share and distribute data
2. Utilizes data standards for data ingest, data distribution and sharing
3. Conforms to interoperability standards and conventions being developed under the Group on Earth Observations, World Meteorological Organization, Open Geospatial Consortium
4. Flexibility to add new data outputs
5. Ability to control data distribution/sharing

Other

1. Self-contained system
2. Allows for multi-language capabilities
3. Ability to control entire system
4. Contains relation database(s) for storing data, information, and configurations

AIRNow-I Components

AIRNow Data Management System

- Ingest, processing, QC, monitoring

AIRNow Mapper

- Interpolation, contouring, output

AIRNow Information Service

- Data pushing, web services

AIRNow Database

- Storage of data, settings, information

Administration system

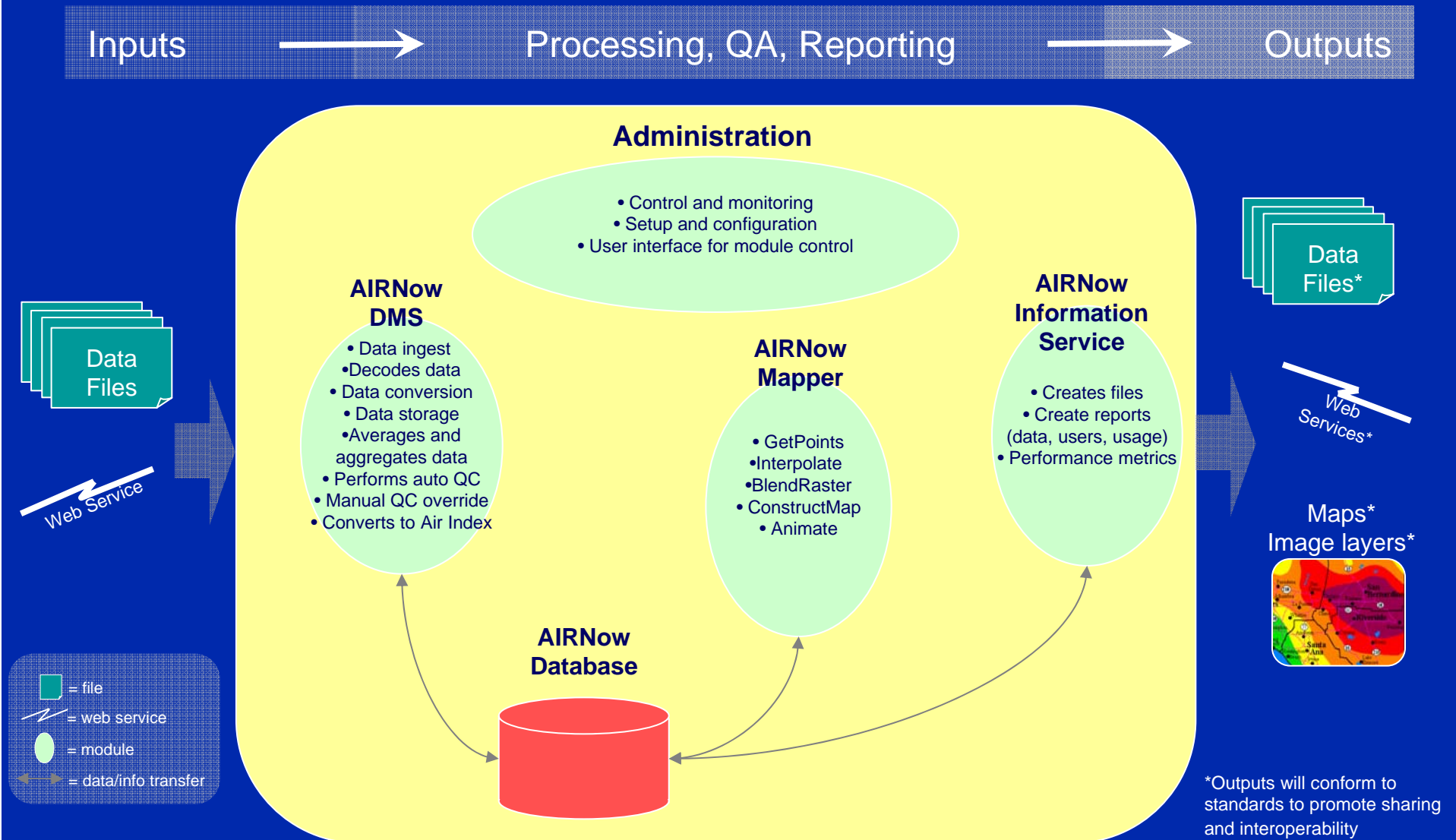
- Control, user interface

Education

- Manuals, tutorials, training, capacity building
- Instructional web site

AIRNow International System

(Conceptual and Functional Design and Data Flow)



AIRNow-I Components

Data Management System (1 of 2)

- Data ingest, processing, reporting system
 - Automated ingest of any data (1-min, hourly, 24-hr averaged)
 - Automated QC checks in real time
 - QC-initiated actions (e.g., e-mails)
 - Visual review and editing tools
 - Automated chain of custody
 - Ensured data integrity
 - Consolidated database and reporting
- Leveraged from AIRNow systems and experience
- Extensible (expandable by design) and customizable
- Currently building for South Coast AQMD, Bay Area AQMD, and California ARB

AIRNow-I Components

Data Management System (2 of 2)

DMS - Test Test

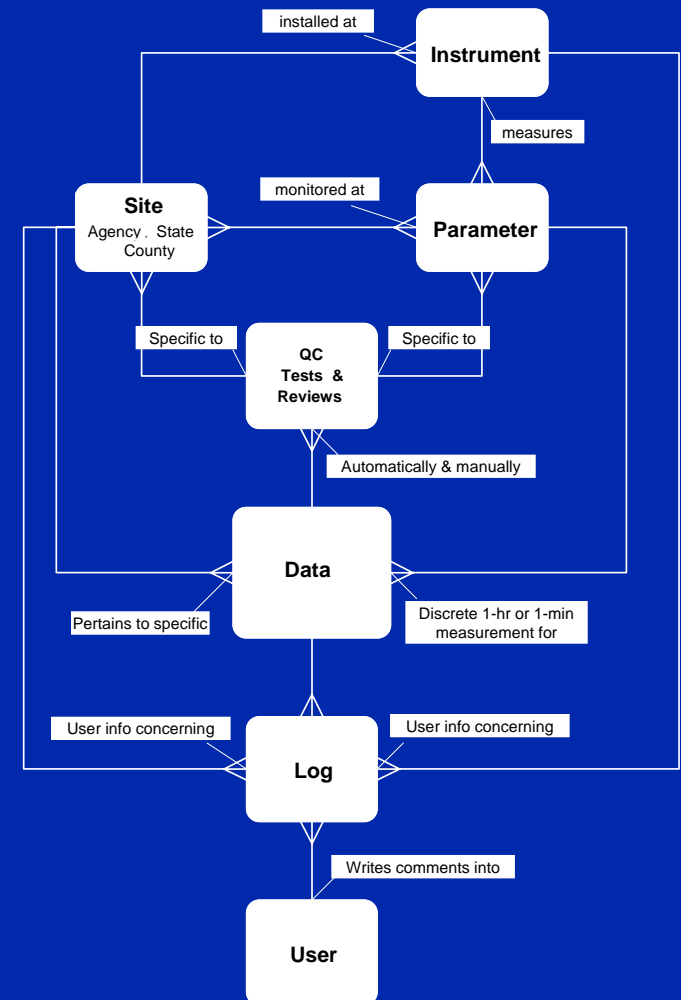
Status Data Administration

Sites Select Instruments Instruments Select Parameters Parameters QC Tasks

Save Changes Export

Sites

Station ID	Station Name	Agency	Primary	County	State	AQSCode	Latitude	Longitude	UTC Offset	E
0	Warehouse	BAAQMD	<input type="checkbox"/>	San Francisco	CA		0.000000	0.000000		0
1014	Fremont-Chapel Way	BAAQMD	<input type="checkbox"/>	Alameda	CA		37.535800	-121.961866		1
1015	Hayward-La Mesa	BAAQMD	<input type="checkbox"/>	Alameda	CA		37.654400	-122.031650		2
1022	San Leandro	BAAQMD	<input type="checkbox"/>	Alameda	CA		37.710233	-122.116883		4
1023	Livermore - Rincon Ave.	BAAQMD	<input type="checkbox"/>	Alameda	CA		37.687527	-121.784222		1
1024	Oakland - Filbert St.	BAAQMD	<input type="checkbox"/>	Alameda	CA		37.817150	-122.280483		1
2010	Pittsburg-W 10th St	BAAQMD	<input type="checkbox"/>	Contra Costa	CA		38.029300	-121.896900		2
2013	Pt. Richmond	BAAQMD	<input type="checkbox"/>	Contra Costa	CA		37.926300	-122.385600		2
2014	Martinez - Jones St	BAAQMD	<input type="checkbox"/>	Contra Costa	CA		38.012888	-122.133805		8
2017	Crockett - Kendall Ave	BAAQMD	<input type="checkbox"/>	Contra Costa	CA		38.054600	-122.233300		7
2019	Richmond - 7th St	BAAQMD	<input type="checkbox"/>	Contra Costa	CA		37.947800	-122.365100		6
2021	Bethel Island	BAAQMD	<input type="checkbox"/>	Contra Costa	CA		38.006333	-121.642000		-2
2034	Rodeo	BAAQMD	<input type="checkbox"/>	Contra Costa	CA		38.034361	-122.270444		1
2035	San Pablo - Rumrill	BAAQMD	<input type="checkbox"/>	Contra Costa	CA		37.960400	-122.356800		2
2036	Concord - 2956-A Treat Blvd	BAAQMD	<input type="checkbox"/>	Contra Costa	CA		37.936000	-122.026200		2
3005	San Rafael	BAAQMD	<input type="checkbox"/>	Marin	CA		37.972300	-122.520200		3
4001	Napa - Jefferson St	BAAQMD	<input type="checkbox"/>	Napa	CA		38.311000	-122.296100		1
5011	San Francisco - Arkansas St.	BAAQMD	<input type="checkbox"/>	San Francisco	CA		37.765950	-122.399050		5
6004	Redwood City	BAAQMD	<input type="checkbox"/>	San Mateo	CA		37.482933	-122.203366		3
7006	Los Gatos	BAAQMD	<input type="checkbox"/>	Santa Clara	CA		37.226733	-121.979633		1
7015	Gilroy - 9th St	BAAQMD	<input type="checkbox"/>	Santa Clara	CA		36.999450	-121.574716		6
7019	San Jose	BAAQMD	<input type="checkbox"/>	Santa Clara	CA		37.306200	-121.848850		3



AIRNow-I Components

AIRNow Mapper (1 of 6)

- Small coupled programs based on ESRI ArcObjects
 - GetPoints
 - Interpolate
 - BlendRaster
 - ConstructMap
 - Animate
- Command line driven
- Scheduled with system (DataFlow)
- Works with GIS data in file or a geodatabase



AIRNow-I Components

AIRNow Mapper (2 of 6)

GetPoints

- Calls stored procedures (Oracle/SQL Server) to extract AIRNow data
- Creates an ESRI shapefile
- Inputs
 - Oracle connection info
 - Date
 - Bounding box (maximum spatial extent)
 - Parameter
- Output
 - Shapefile on disk (or FeatureClass in geodatabase)

AIRNow-I Components

AIRNow Mapper (3 of 6)

Interpolate

- Interpolate point data set (e.g., shapefile) to a continuous raster image
- Inputs
 - Point data set (e.g., shapefile)
 - Interpolation technique
 - Selectable: IDW, Kriging, Spline)
 - Interpolation parameters: number of points, maximum variable radius, and weighting
 - Parameters vary by interpolation technique
 - Bounding box (maximum spatial extent)
 - Cell size (grid resolution)
- Output
 - Raster in file or geodatabase
 - Various formats; IMAGINE format by default

AIRNow-I Components

AIRNow Mapper (4 of 6)

BlendRaster

- Perform operations on multiple raster data sets to produce a result
(Ozone + PM_{2.5} + PM₁₀ → AQI map)
- Inputs
 - Raster algebra operation (defined in ESRI's raster map algebra)
 - Raster data sets for each input raster
- Output
 - Raster in file or geodatabase
 - Various formats; IMAGINE format by default

AIRNow-I Components

AIRNow Mapper (5 of 6)

ConstructMap

- Render a map image from an ESRI ArcMap map document template
- Inputs
 - ArcMap template document (.mxd file)
 - Data layer name (Ozone raster)
 - Dynamic information (date, time, parameter, titles)
- Output
 - Map image in JPEG, GIF, TIFF, PNG, etc.

AIRNow-I Components

AIRNow Mapper (6 of 6)

Animate

- Use convert.exe tool from the freely-available ImageMagick suite
- Inputs
 - Location of GIF images
- Outputs
 - Animated GIF

Northeast

October 17, 2007 10:09



AIRNow-I Components

AIRNow Information Service

Need to define services

Distribution to

- Agencies/organizations
- Public
- GEOSS

Products

- Data
- Maps
- Grids
- Site information
- Information (alerts, etc.)

Issues – Software

DMS

- Microsoft SQL Server 2005 (Workgroup, Standard, and Enterprise editions)

Mapper

- ESRI ArcObjects (standalone ArcGIS Engine or use ArcObjects implementation installed with ArcMap or other ESRI desktop tools)

Information Service

- tbd

Collaborations

Who

- Data Management System (CA districts)
- AiRNow domestic improvements
- Shanghai EPB
- SERVIR-air
- NILU
- Others?

How

- Joint development
- Review of design and architecture
- Other ideas?

Plans – Shanghai

- Meeting November 5-7, 2007 with SEMC
- Agenda
 - Discuss AIRNow-International plans
 - Better understand needs
 - Discuss data distribution plans and understand the issues
 - Develop schedule
 - Determine any special features for Shanghai

Plans – Hong Kong & Guangdong EPBs

- Meeting November 8-9, 2007
- Agenda
 - Discuss AIRNow-International plans
 - Better understand needs
 - Discuss data distribution plans and understand the issues
 - Discuss sustainability issues